				,,				<u> </u>	
Work Order July-11-12 9:44:40			*871	158*				, ·=	La Company
Revision ID:	12-664-203TRN		Accept	*N900	040	100)* s	Setup Star Stop	· IV.
Start Date: 7/1 Required Date: 8/1 Reference:	1/12 Start Qty: 1.00 0/12 Req'd Qty: 1.00	*1* *1*		Cust Item I Customer:	D:	÷			·
	rocess Plan:	Date: /2-07,	//Prooling: SPC (Y/N):		nte:		F	Run Star Stop	"
Sequence ID/ Work Center ID	Operation Description	······································	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number
Draw Nbr	Revision Nbr								
D412-664-243	Rev E(DEO)	4.3							
100 *100* Mori Seiki	MORI SEIKI CNC LA	THE LARGE	0.00				_ /	þ	K

110

QC1-Inspect dimensions to dimension sheet

FOLIO REV:_ DWG REV:_

0.00

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166
2-Turn first side as per Folio FA166
3- File transition lines smooth.

110

Mori Seiki CNC Lathe Large

Memo

Memo

0.00

Quality Control

Page 1

Insp. Stamp

Dart	Aeros	pace	Ltd
Dail	へここしろ	Dave	Lu

									£
W/O:			W	ORK ORDER CHANGI	ES				
DATE	STEP	PRO	CEDURE CH	ANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC inspector
Part No		PAR #:	Fault Cat	egory:	NCR: Yes	No DQ	A:	Date:	
	R	esolution:	Dispositi	on: `	_ QA: N/C CI	osed:		Date: _	
NCR:		V	VORK ORI	DER NON-CONFORMA	NCE (NCF	R)			
DATE	STEP	Description of NC		Corrective Action Section		Verifi	cation	Approval	Approval
DAIE	SIEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign 8 Date		ion C	Chief Eng	QC Inspector
	٠			·					:
:						:			

Work Ord July-11-12 9:4		7158		*871	58*						Page 2
Item ID: Revision ID:	D412-664-			Accept	*N900	040	100)* s	etup Star Stop	171	S1*
Item Name:	Crosstube To	urning Detail							Stop	" *N	S2*
Start Date:	7/11/12	Start Qty: 1.00	*1*		Cust Item	ID:					
Required Date Reference:	8/10/12	Req'd Qty: 1.00	*1*		Customer:						
Approvals:	Process P	lan:	Date:	Tooling:	D	ate:		R	tun Star	1/1	R1*
	QC:		Date:	SPC (Y/N):	D	ate:			Sto	*N	R2*
Sequence ID/ Work Center	ID	Operation Description		Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120		MORI SEIKI CNC LATI	JE I ADCE	0.00				_		,	<i>(</i> 0
120 Mori Seiki		Memo	1E LARGE	0.00					/	_ KC	_ 12-7-2
Mori Seiki CNC L	athe Large	1-Turn secon 2- File transi 3- Remove:									
130		QC1- Inspect dimensions	to dimension sheet	0.00							
130								,	6	K	2 12-7
QC		Memo		0.00				-1			
Quality Control		+ PERFORM	MULTRA SONIC ME	ASUREMENT							
¹⁴⁰ *1∆∩ *		QC8- Inspect parts - seco	and check	0.00			D 0	3			
OC OC		Memo		0.00			78	7	- 	\mathcal{V}	

+ CHECK ULTRA SONIC MEASUREMENT AND ORIENTATION FOR

BENDING

Quality Control

Dart Aerospace Ltd

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W/O:			WO	RK ORDER CHANGE	S				` .
DATE	STEP	PRO	OCEDURE CHAN	IGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No		PAR #:			NCR: Yes	No DQ	A:	Date:	
	Resc	olution:	Disposition	: `	QA: N/C CI	osed:		Date: _	
NCR:	,	,	WORK ORDE	R NON-CONFORMAN	NCE (NCF	₹)			
DATE	STEP	Description of NC	Initial	Corrective Action Section	B Sign 8		cation	Approval	Approval
· · · · · · · · · · · · · · · · · · ·		Section A	Chief Eng	Action Description Chief Eng	Date	Section 1	on C	Chief Eng	QC Inspector
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		50							
		*							
									1

Work Ord <i>July-11-12 9:44</i>		7158		*871	58*				Page 3
Item ID: Revision ID: Item Name:	D412-664-	203TRN urning Detail		Accept	*N90004	l0100*	Setup S	tart *NS	1* 2*
Start Date: Required Date: Reference:	7/11/12	Start Qty: 1.00 Req'd Qty: 1.00	*1 [°]		Cust Item ID: Customer:			14.12	
Approvals:	Process P	lan:	Date:		Date:			Start *NR	1* 2*
Sequence ID/ Work Center II 145 *145* Crosstubes Crosstubes	D	Operation Description Memo GRIND ON	LY TRANSITION L	Set Up/ Run Hours 0.00 0.00 INES SMOOTH LONGITUDE	$M \cap$	ol# Plan Acc Code Qty			sp. amp
150 *150* HandFXtube Hand Finishing Cro	sstubes		RE WASH X-TUBE CH X-TUBE INSID	0.00 0.00 INSIDE AND OUT E AND OUT. USE RED SCO'	TCH BRITE	mok	<i>l</i>	 Z~7-Zs	
160 *160* QC Quality Control		QC5- Inspect part compl	eteness to step on W	/O 0.00 0.00		PAS)) 12-7	- 25

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Dart Aerospace Ltd

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W/O:			WO	RK ORDER CHANGE	S	. =			
DATE	STEP	PROC	EDURE CHAI	NGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No	:	PAR #:	_ Fault Cate	gory:	NCR: Yes	No DQ	A:	Date:	
	R	esolution:	_ Disposition	n: '	QA: N/C	Closed:		Date: _	
NCR:		W	ORK ORDE	ER NON-CONFORMA	NCE (NC	R)			
		Description of NC		Corrective Action Section	n B	Verifi	cation	Approval	Approval
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign Dat	& Sec	tion C	Chief Eng	QC Inspector
				·					
									}
		¥3.							

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Work Ord <i>July-11-12 9:</i>		7158		*87	158*						Page
Item ID: Revision ID:	D412-664	-203TRN		Accept	*N900	040	100)* s	Setup Sta	rt *N	S1*
Item Name:	Crosstube T	urning Detail							Sto	p *N	S2*
Start Date: Required Dat	7/11/12 e: 8/10/12	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*		Cust Item I Customer:	D:					
Reference:											
Approvals:	Process I	Plan:	Date:	Tooling:	D:	ate:		F	Run Sta	1/7	R1*
	QC:			SPC (Y/N):	D:	ate:			Sto	*N	R2*
Sequence ID/ Work Center	ID	Operation Description		Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
170				0.00				_		•	
170 Packaging		Packaging Memo		0.00	\mathcal{N}		1	2-1	11/25	<u> </u>	

0.00

0.00

Identify and stock in kanban rack Location:

QC21- Final Inspection - Work Order Release

Memo

Packaging

180

120

Quality Control

MLJ 12/07/25 MK 7.25

Page 4

Dart Aerospace Ltd

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W/O:			WO	RK ORDER CHANG	ES		· ·		
DATE	STEP	PRO	OCEDURE CHAN	IGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
							:		
Part No	:	PAR #:	Fault Categ	ory:	NCR: Ye	s No DC)A:	Date: _	
	Re	esolution:	Disposition	: <u>`</u>	_ QA: N/C	Closed:		Date: _	
NCR:			WORK ORDE	R NON-CONFORMA	NCE (NC	R)			
DATE	STEP	Description of NC		Corrective Action Section			cation	Approval	Approval
		Section A	Initial Chief Eng	Action Description Chief Eng	Sigr Da		tion C	Chief Eng	QC Inspector
							_		
									, E 1
									:

Picklist Print

July-11-12 9:44:40 AM

Work Order ID:

87158

Parent Item:

D412-664-203TRN

Parent Item Name:

Crosstube Turning Detail

Start Date: 7/11/12

Required Date: 8/10/12

Page 1

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev:A 08-03-06 new issue DD verified by:eec

IPP Rev B 08.04.02 Removed polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6009-129		Manufactured	No			120	Each	19.0000	1	1			
Crosstube Material													
				Location		Loc Oty	Lo	c Code					

19

19

- mant 12/07/19

LG

Dart Aerospace Ltd

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		W	ORK ORDER CHANG	ES					*
STEP	PRO	OCEDURE CH	ANGE	Ву	,	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
					-				
:	PAR #:	Fault Cate	egory:	NCR: Y	es N	o DQ	A:	Date: _	
R	esolution:	Disposition	on: `	_ QA: Ņ/C	Clos	sed:		Date: _	
		WORK ORE	ER NON-CONFORMA	NCE (N	CR)				
OTED.	Description of NC					Verific	cation	Approval	Approval
SIEP	Section A	Initial Chief Eng	Action Description Chief Eng					Chief Eng	QC Inspector
		.:							
		•							
	,								
					· · ·				
									:
	STEP	STEP PRO PRO PAR #: Resolution: Description of NC	STEP PROCEDURE CHA :PAR #:Fault Cate Resolution:Disposition WORK ORD STEP Description of NC Section A Initial	WORK ORDER CHANGE PROCEDURE CHANGE PROCEDURE CHANGE Fault Category: Disposition: WORK ORDER NON-CONFORMA STEP Description of NC Section A Initial Action Description	WORK ORDER CHANGES STEP PROCEDURE CHANGE By :PAR #:Fault Category:NCR: YOURGES Resolution:Disposition:QA: N/O WORK ORDER NON-CONFORMANCE (N STEP Description of NC	WORK ORDER CHANGES STEP PROCEDURE CHANGE By :PAR #:Fault Category:NCR: Yes N Resolution:Disposition:QA: N/C Clos WORK ORDER NON-CONFORMANCE (NCR) STEP Description of NC Section A Initial Action Description Sign &	WORK ORDER CHANGES STEP PROCEDURE CHANGE By Date :PAR #: Fault Category: NCR: Yes No DQ. Resolution: Disposition: QA: N/C Closed: WORK ORDER NON-CONFORMANCE (NCR) STEP Description of NC	WORK ORDER CHANGES STEP PROCEDURE CHANGE By Date Qty	WORK ORDER CHANGES STEP PROCEDURE CHANGE By Date Qty Chief Eng/Prod Mgr :PAR #:Fault Category:NCR: Yes No DQA:Date:

DART AEROSPACE LTD	Work Order:	87158
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: E		Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	spection Sheet awing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
	2.684	+0.005/-0.000	2.688	1/		VERW	CNC
	2.748	+0.005/-0.000	2.753	1/		1	
	2.884	+0.005/-0.000	2.888	//			
	3.019	+0.005/-0.000	3.024	//			
	3.163	+0.005/-0.000	-3,168				
	3.308	+0.005/-0.000	3.3/3	/			
4	3.429	+0.005/-0.000	3.432	/			
SIDE	2.990	+0.005/-0.000	2.994	//			
S	2.618	+0.005/-0.000	2.623				
	0.000	. / 0 040					
	0.200	+/-0.010	200			4	1
*	R0.063	+/-0.010	.063	-/-		RG	PG.
	R0.500	+/-0.010	.500	//		P6	RL
	4.971	+/-0.030	4.978			VERN	CNC-08
	0.004	.0.005/.0.000	2 (6 6				(
	2.684	+0.005/-0.000	2.689				
ľ	2.748	+0.005/-0.000	2.753				
	2.884	+0.005/-0.000	2.889	/		· · · · · · · · · · · · · · · · · · ·	
	3.019	+0.005/-0.000	3.029				
	3.163	+0.005/-0.000	3.168	-/-	 		
1	3.308	+0.005/-0.000	3-313	//	ļ		
8	3.429	+0.005/-0.000	3, 4, 5		ļ <u></u>		
SIDE	2.990	+0.005/-0.000	2.993				
, o	2.618	+0.005/-0.000	2.622.				
	0.200	+/-0.010	200	/		4	₩
	R0.063	+/-0.010	-063	1/		R6	RG
	R0.500	+/-0.010	,560	1		RL	RC
	4.971	+/-0.030	4,975			VERN	CNC-08
	124.100	+/-0.020	124.100			tape	96622

										• •		DQA:	Date:	
NCR:	Yes	/ No					WORK ORDER NON-C	O	VFOR	MANCE / UPDATE		•		
												QA Closed:	Date:	
Vork Ord	Order: DISPOSITION									AGAIN	PROCESS			
Part							Rework Scrap Use-as-is		Skid-tube Crosstube Machining Small Fab Thermoforming Finishing			l	Water Jet d. Eng. Coor. e/Packaging	Engineering Quality Other
NCR	No.						Work Order Update]		Large Fab Composi	~ <u> </u>	•	Supplier	
Root					Des	crip	otion of work order update		nitial	Action		Sign &		
Cause		Date						Ch	ief Eng	Description		Date	Verification	QC Inspector
oc/Data quip/Tooling perator laterial etup ther														
rocess upplier raining napproved														
							<u> </u>	AUL	T CATE	GORY			·	
Land	ing (Gear					General	_				•	_	-
		Bending Centre No Cracks Crushed/G			o/s		Bend BOM/Route Broken/Damaged Burrs Contamination		Inspecti	Hardware Inspection Incomplete Instructions Incomplete/Unclear		Over/Under tolerance Temperatu Part Incorrect Weld		Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled
		Heat Trea					Countersink		Mislabe	eled		Positioned V		,
	<u></u>	Inspection	Tube			Cut Too Short	_	Misread	j		Power Loss/	Surge • •	Other	
		Ripples in				L	Drill Holes	\perp	Offset					
		Torque W	/aves in E	Extrusio	n	<u> </u>	Drawing		Out of (Calibration				· ·
	1	Turning Sequence Finish							Out of 9	Sequence				

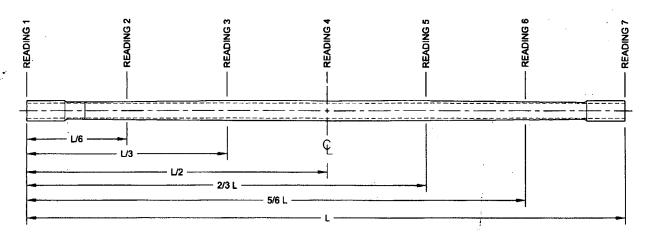
Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Wave/Twist in Tube

DART AEROSPACE LTD	Work Order:	87158
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: E		Page 2 of 2

WALL THICKNESS MEASUREMENT



	WALL	THICKNESS I	MEASUREMEN	IT (IN)	Deviation	
Location	w1	w2	w3	w4	Δw (max-min)	TOLERANCE
READING 1 L= 0"	,401	.390	.351	.358	.050	
READING 2 L=	.33)	.313	,295	.308	.036	
READING 3 L=	.492	.474	.474	.492	018	
READING 4	650	.643	-631	.639	019	0.073"
READING 5 L=	489	,491	.472	.477.	.019	
READING 6 L=	315	.320	306	,305	.015	ļ
READING 7 L=	396	.381	. 360	.370	.026	

Calibration Result

Actual Block Thickness: 100-500

Sitescan 250 Measured Thickness: 100-500

Measured by:	Audited by:		Preliminary Approval:	
Date: 12-7-22	Date:	2-7-24	Date:	

Rev	Date	Change	Revised by	Approved
Α	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	-
В	06.03.09	Dwg Rev updated	KJ/JLM	
С	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	
D	10.02.02	Dimension 124.100 was 124.09	KJ / A	11
E	12.06.04	Wall thickness form added	KJ OX	
				

										DQA:	Date:			
NCR:	Yes /	No No				WORK ORDER NON-C	ONFO	RMANCE / UI	PDATE					
										QA Closed:	Date:			
Work Orde	er:					DISPOSITION		AGAINST DEPARTMENT/PROCESS						
Part No.						Rework Scrap		Skid-tube Machining	Crosstube Small Fab	Water Jet Prod. Eng. Coor.		Engineering Quality		
NCR N	No					Use-as-is Work Order Update	Thermoforming Finishing Large Fab Composite			Rec/Sto	Other			
Root					Descri	ption of work order update	Initia	Α	ction	Sign &				
Cause		Date	Step	Qty	C	or Non-conformance	Chief E	ng Des	cription	Date	Verification	QC Inspector		
Doc/Data														
Equip/Tooling		1												
Operator							<u> </u>							
Material														
Setup														
Other												ļ		
Process														
Supplier														
Training			,							فع				
Unapproved										,				
						F	AULT CA	TEGORY						
Landi	ng Ge	ar				General				_				
	В	ending				Bend	Gra	n		Ovalized		Pressúre/Forced		
	Centre Not Concentric to O/S BOM/Route						Hard	ware		Over/Under tolerance Temperature/Cure				

Inspection Incomplete

Maintenance

Out of Calibration

Out of Sequence

Outside Dimensions

Mislabeled

Misread

Offset

Instructions Incomplete/Unclear

Weld

Other

Wrong Stock Pulled

Part Incorrect

Part Moved

Part Lost/Missing

Positioned Wrong

Power Loss/Surge

Broken/Damaged

Contamination

Countersink

Cut Too Short

Drill Holes

Drawing

Finish

Folio

Burrs

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Cracks

Cuffs

Heat Treat

Crushed/Crimped.

Inspection Strip in Tube

Torque Waves in Extrusion

Item	Qty -243	Part Number	Description
1	х	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE .
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
6	2	D2856-600-1009	ABRASION STRIP
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTROMBELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
- FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING) 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
- PAINT OUTSIDE PER DART QSI 005 4.2 TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 47.0 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

41158 00/120112

С

DECIGAL	OH DARTAFROOD	AOF	TD
REV.	DESCRIPTION	BY	DATE
Α	NEW ISSUE	PH	01.10.17
В	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
С	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30	мв	06.10.27
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
E	REFORMAT/REVISE GENERAL NO/TES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN 46-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TUNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	, RF	09.09.30

DESIGN	#	□ DART AEROSPACE LTD							
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	HAWKESBURY, ONTARIO, CANADA						
CHECKED	9	DRAWING NO. REV.	. E						
MFG. APPR.	177	D412-664-243 SHEET 1 0	F 4						
APPROVED	140	TITLE SCA	ALE						
DE APPR.	-44	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS						
DATE 09.0	9.30	COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND COMPOSITION THAT AND IS SUPPLIED ON THE EXPRESS CONDITION THAT	TITIS CUT						

											DQA:	Date:		
NCR:	Yes /	No				WORK ORDER NON-C	100	VFORM	MANCE / UPI	DATE				
						•					QA Closed:	Date:		
Work Orde	or.					DISPOSITION			AGAINST DE	PARTMENT	/PROCESS			
Part f	No					Rework Scrap Use-as-is Work Order Update	Scrap Machining Small Fab Use-as-is Thermoforming Finishing			4	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering Quality Other		
Root					Descri	ption of work order update	1	nitial	Act	tion	Sign &			
Cause	D.	ate	Step	Qty		or Non-conformance	Ch	ief Eng	Desci	ription	Date	Verification	QC Inspector	
Doc/Data														
Equip/Tooling									!	•				
Operator														
Material				·										
Setup		:												
Other														
Process		j												
Supplier														
Training									-					
Unapproved														
						F	AUL	T CATE	GORY					
Landi	ng Gear					General		_			_		_	
Bending						Bend	L	Grain			Ovalized		Pressure/Forced	
	Cen	tre Not	Concer	ntric to	o/s	BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure	
	Crac	:ks				Broken/Damaged		Inspect	on Incomplete		Part Incorre	ct	Weld	
	Crus	hed/C	rimped.		Γ	Burrs		Instructions Incomplete/Unclear			Part Lost/M	issing	Wrong Stock Pulled	
Ì	Cuff	s				Contamination		Mainte	nance		Part Moved		- .	
	Hea	t Treat				Countersink	Г	Mislabe	eled	├ ─┤				

Misread

Out of Calibration

Out of Sequence

Outside Dimensions

Offset

Power Loss/Surge

Other

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Inspection Strip in Tube

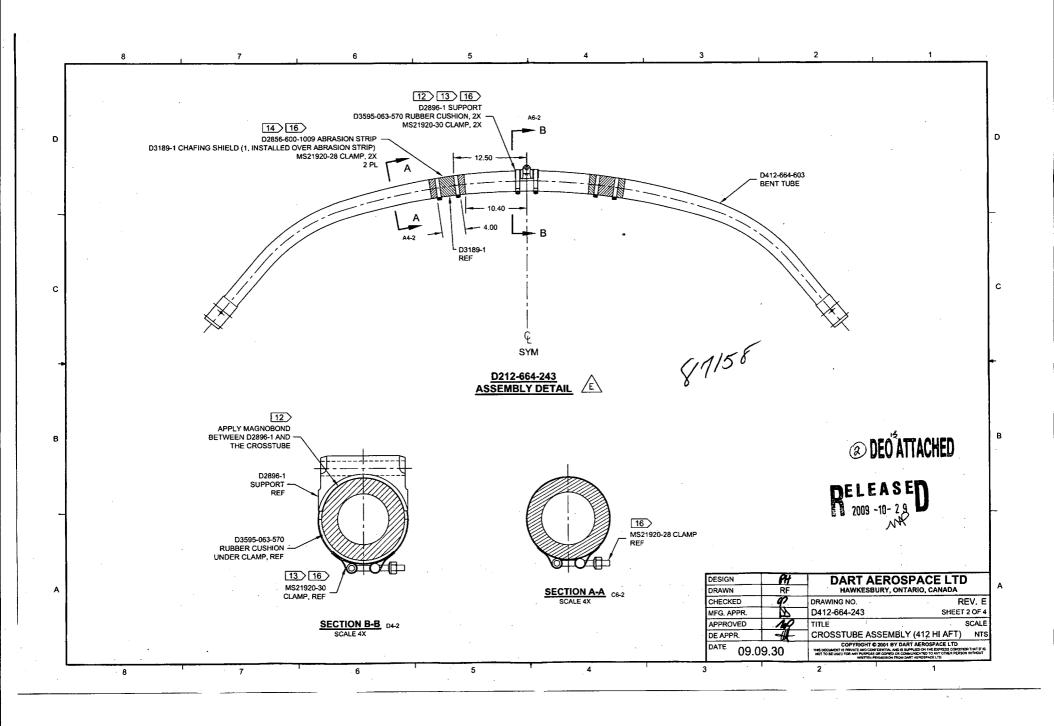
Torque Waves in Extrusion

Cut Too Short

Drill Holes

Drawing

Finish Folio



												DQA:	Date	:
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i von Cra	٠					Rework		Skid-tube	Crosstube	Г	•	Water Jet	Engineering	
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Material			1											
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Unapproved				<u> </u>										
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Bending						Bend	_	Grain			L	Ovalized	_	Pressure/Forced
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		Cracks			L	Broken/Damaged	L	- '	on Incomplete		L	Part Incorre	ct _	Weld
	匚	Crushed/	Crimped.			Burrs		Instruct	ions incomplete/Und	clear		Part Lost/M	ssing	Wrong Stock Pulled
j		Cuffs				Contamination]Mainte	nance			Part Moved	_	
		Heat Trea	t			Countersink		Mislabe	led			Positioned \		
		Inspection	n Strip in	Tube		Cut Too Short	Г	Misread	! .		Power Loss/	Surge	Other	

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

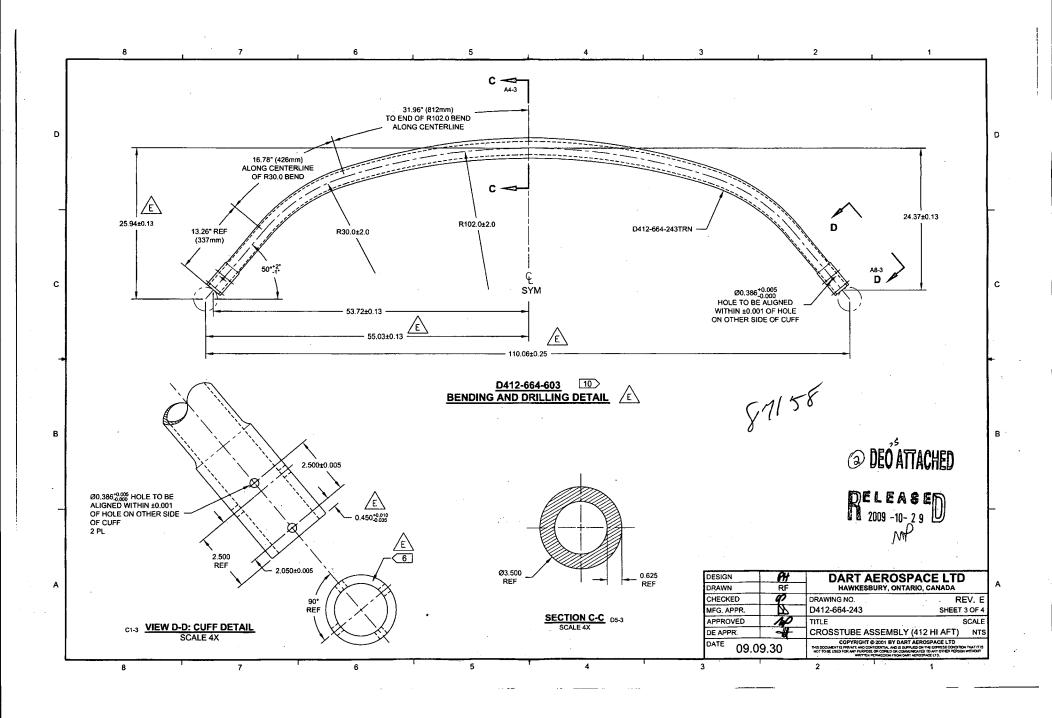
Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

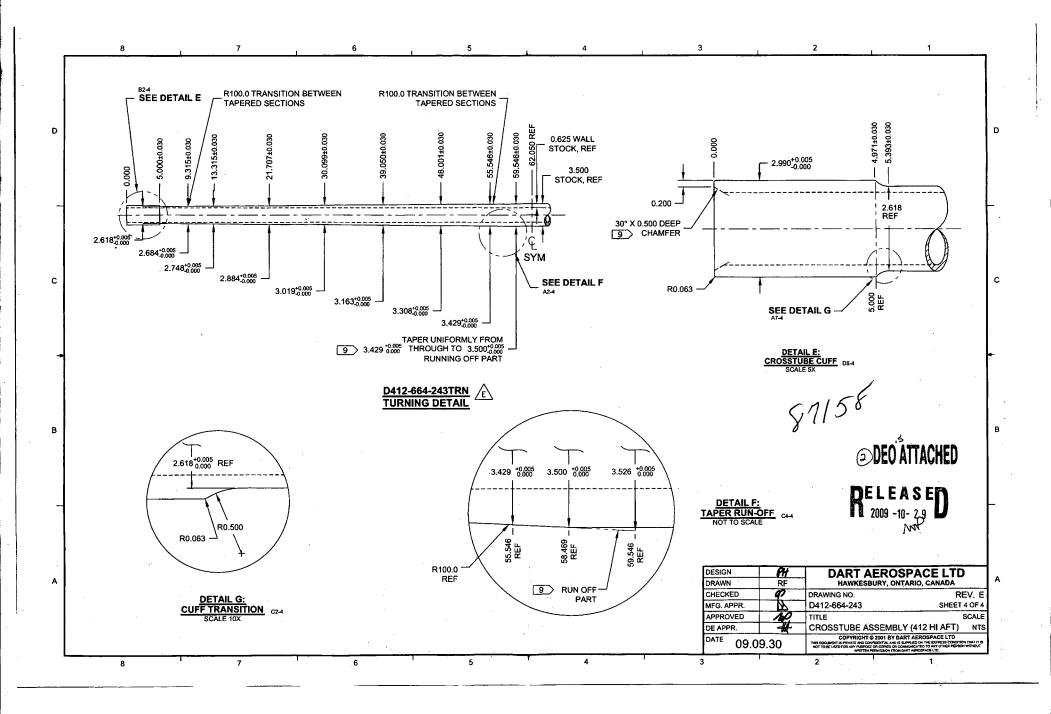


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Root				Description of	work order update	Initial	Ad	tion	Sign &			
Cause	Date	Step	Qty	or Non-co	onformance	Chief En	Desc	cription	Date	Verification	QC Inspector	
Doc/Data Equip/Tooling Operator Material Setup Other								-				

Unapproved **FAULT CATEGORY Landing Gear** General Bend Grain Ovalized Pressure/Forced Bending BOM/Route Over/Under tolerance Temperature/Cure Centre Not Concentric to O/S Hardware Broken/Damaged Inspection Incomplete Weld Part Incorrect Cracks Crushed/Crimped. Burrs Instructions Incomplete/Unclear Part Lost/Missing Wrong Stock Pulled Cuffs Contamination Maintenance Part Moved Mislabeled Countersink Positioned Wrong Heat Treat Other Inspection Strip in Tube Misread Power Loss/Surge **Cut Too Short** Drill Holes Offset Ripples in Bend Torque Waves in Extrusion Drawing Out of Calibration Turning Sequence Finish Out of Sequence Folio Wave/Twist in Tube **Outside Dimensions**

Process Supplier Training

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											DQA:	Date:	
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Root					Descri	ption of work order update	1	nitial	Action	1	Sign &		
Cause		Date	Step	Qty	(or Non-conformance	Ch	ief Eng	Descript	tion	Date	Verification	QC Inspector
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Landi	ng (Gear				General		_			_		_
		Bending				Bend		Grain			Ovalized		Pressure/Forced
Centre Not Concentric to O/S BOM/Route					BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure	
Cracks Broken/Da						Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct	Weld .
Crushed/Crimped. Burrs						Burrs		Instruct	ions Incomplete/Unc	lear	Part Lost/Mi	ssing	Wrong Stock Pulled
	Cuffs Contamination							Mainte	nance		Part Moved		-
		Heat Trea	nt			Countersink		Mislabe	led		Positioned V	Vrong	
		Inspection Strip in Tube				Cut Too Short	Г	Misread			Power Loss/	Surge	Other

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DRAWING NO.	TITLE	REV. E	DART AEROSPACE LTD	D.E.O. NO.	SHEET NO.	SCALE
D412-664-243	CROSSTUBE ASSE	EMBLY (412 HI AFT)	ENGINEERING ORDER	D412-664-243-E-1	SHEET 1 OF 2	NTS
DRAWN	CHECKE	D M	MFG. APPR.	APPROVED MAP	DE APPR.	
DATE 11.0	3.31 DATE	11/03.31	DATE #1.03.31	DATE 11/03·3)	DATE 11-03.31	

PURPOSE:

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

CHANGE:

PARTS LIST IS AMENDED AS FOLLOWS:

<u> 15:</u>

Item	Qty -243	Part Number	Description
6	0	D2856-600-1009	ABRASION STRIP

WAS:

6	2	D2856-600-1009	ABRASION STRIP

NOTES 2 AND 14, SHEET 1 ARE AMENDED AS FOLLOWS:

<u>IS:</u>

2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2

MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)

PAINT OUTSIDE PER DART QSI 005 4.2

AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA

14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

WAS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
 PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.

81158



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Work Ord	er.					DISPOSITION				AGAINST DI	EPA	RTMENT/	PROCESS		
WORK OTAL	-					Rework			Skid-tube	Crosstube		Water Jet			Engineering
Part i	No. ِ					Scrap	•	Machining	Small Fab	_	Prod. Eng. Coor.			Quality	
NCD	.					Use-as-is Thermoforming			Finishing	4	Rec/Stor	e/Packaging	_	Other	
NCR I	νо			u.		Work Order Update]		Large Fab	Composite	_		Supplier		
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	Crushed/Crimped.					Burrs		Instruct	ions Incomplete/	'Unclear	Pa	art Lost/Mi	ssing [Wrong Stock Pulled
	Cuffs					Contamination		Mainte	enance		Pa	art Moved	_		
	Heat Treat Coun					Countersink		Mislabe	eled		P	ositioned V	Vrong		_
		Inspection	n Strip in	Tube		Cut Too Short		Misread			P	Power Loss/Surge			Other
	Ripples in Bend Drill Holes					Offset					•				

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

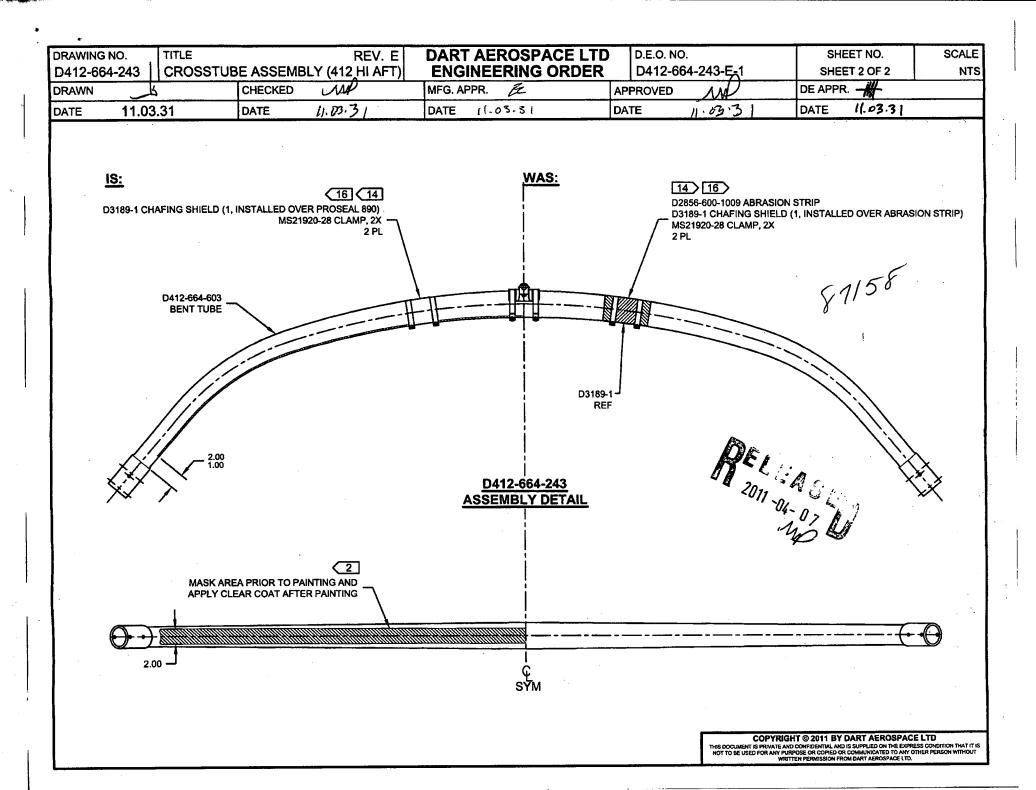
Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G



												DQA:	Date	
NCR:	Yes	/ No				WORK ORDER NON-	100	NFORM	MANCE / UP	DATE				
			-				QA Closed: Date							
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Centre Not Concentric to O/S					o/s	BOM/Route		Hardwa	re		Ove	r/Under	tolerance	Temperature/Cure
Cracks						Broken/Damaged		Inspecti	on Incomplete		Part	Incorre	ct _	Weld
Crushed/Crimped.						Burrs		Instruct	ions Incomplete,	/Unclear	Part	Lost/Mi	ssing	Wrong Stock Pulled
		Cuffs				Contamination		Mainte	nance		Part	Moved		
		Heat Trea	it			Countersink		Mislabe	eled		Posi	itioned V	Vrong	<u></u>
	Inspection Strip in Tube					Cut Too Short		Misread			Pow	ver Loss/	Surge	Other

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DART AEROSPACE LTD SCALE DRAWING NO. TITLE REV. E D.E.O. NO. SHEET NO. **ENGINEERING ORDER CROSSTUBE ASS'Y (412 HI AFT)** D412-664-243-E-2 SHEET 1 OF 1 D412-664-243 NTS MFG. APPR. DE APPR. DRAWN CHECKED APPROVED 11.09.19 11.09.19 DATE 11.09.07 DATE DATE 11.09.19 DATE 11.09.19 DATE

PURPOSE:

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

CHANGE:

IS:

ltem	Qty -243	Part Number	Description
		<u> </u>	
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD

WAS:

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II. CLASS 2 ADHESIVE)

51158

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

WAS:

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.



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		Cuffs		• •	-	Contamination		tenance	· F	Part Moved		
	Heat Treat					Countersink	Mislat	eled ·		Positioned V	Vrong	
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		Ripples in	Bend			Drill Holes	Offset		•			
	_	Torque W			n 🗀	Drawing	Out of	Calibration				
	Turning Sequence					Finish	Out of Sequence					***************************************
Wave/Twist in Tube						Folio	Outsic	le Dimensions	, (